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(54) COMPOSITION FOR INK CURABLE BY ACTINIC RAY

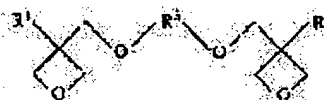
(57)Abstract:

PURPOSE: To obtain the subject composition composed of a compound having oxetane ring, a cationic photopolymerization initiator and a pigment, having excellent curability and various printing properties such as fluidity, pigment dispersibility and low misting tendency, etc., and useful for various printing methods.

CONSTITUTION: This composition contains (A) a compound having 1-4 oxetane rings {e.g. a compound of formula I (R¹ is H, a 1-6C alkyl, allyl, etc.; R² is a 1-6C alkyl, a 2-6C alkenyl, phenyl, a group having aromatic ring such as benzyl, etc.), a compound of formula II [R³ is a linear or branched alkylene, a poly(alkylenoxy), etc.] or a compound of formula III (R⁴ is a 1-12C branched alkylene, branched polysiloxy, etc.; (j) is 3 or 4), (B) a



I



II



III

cationic photopolymerization initiator (preferably diaryliodonium salt or triarylsulfonium salt) and (C) a pigment. The composition is preferably further incorporated with a compound containing epoxy group, a compound containing vinyl ether group, etc.

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CLAIMS

[Claim(s)]

[Claim 1] The constituent for activity energy-line hardening mold ink which consists of the compound and the optical cationic initiator which have 1-4 oxetane rings, and a pigment.

[Claim 2] The constituent for activity energy-line hardening mold ink of claim 1 which contains further the compound which has an epoxy group.

[Claim 3] The constituent for activity energy-line hardening mold ink of claim 1 which contains further the compound which has a vinyl ether radical.

[Claim 4] (Meta) The constituent for activity energy-line hardening mold ink of claim 1 which contains further the compound and the optical radical polymerization initiator which have an acryloyl radical.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the constituent for activity energy-line hardening mold ink which consists of a compound which has an oxetane ring, and the object for prizes is carried out in the field which manufactures and uses ink. In addition, in this specification, an acryloyl radical or a methacryloyl radical is expressed as an acryloyl (meta) radical.

[0002]

[Description of the Prior Art] Conventionally, as ink for printing, what dissolved resin in the organic solvent is used. For example, there is the so-called hyperviscous ink which consists of a varnish made to dissolve rosin nature phenol resin, rosin maleic resin, or oil modified alkyd resin in the petroleum solvent of a high-boiling point as ink used in offset printing. However, since such organic solvent system ink needed a forced drying when drying is late, and is moreover inferior to the abrasion resistance of printed matter, solvent resistance, etc. and it uses this as ink, it had the fault of having needed the dryer and requiring great costs from much energy being required for the desiccation. As a constituent for ink which solves these problems, the constituent for activity energy-line hardening mold ink is used increasingly. Since it does not have fear of environmental pollution since the constituent for activity energy-line hardening mold ink is essentially a non-solvent, and a forced drying is not needed, the dryer etc. is needed and it has many advantages, like there is nothing.

[0003]

[Problem(s) to be Solved by the Invention] Most conventional constituents for activity energy-line hardening mold ink are concentrated on polyfunctional acrylate, unsaturated polyester, etc. which are hardened according to an activity energy-line initiation radical polymerization, and these compounds are still used in large quantities even today. However, there was nothing that fulfills altogether printabilities, such as a fluidity as printing ink, pigment dispersibility, and a misting, respectively, without the case where the viscosity of a constituent is too high to use it spoiling ***** and hardenability, and surface hardness, when these compounds are used as a constituent for activity energy-line hardening mold ink. Moreover, as activity energy-line hardening techniques other than an activity energy-line initiation radical polymerization, the activity energy-line initiation ionic polymerization technique is put in practical use. There is no limit that especially activity energy-line initiation cationic polymerization must be carried out especially under an inert atmosphere since a polymerization is not checked by oxygen, and it has the advantage that a prompt and perfect polymerization can be performed in air. Development of an activity energy-line initiation cationic polymerization technique was concentrated on two kinds of monomers called an epoxy resin and vinyl ether till today. Especially a photoresist epoxy resin is excellent in an adhesive property, and the hardening film has thermal resistance and good chemical resistance. However, in the conventional photoresist epoxy resin, since it had the defect in which a photopolymerization rate is comparatively slow, it was not able to be used in the application asked for prompt photo-curing. Moreover, toxicity including mutation is pointed out and, as for the photoresist epoxy resin of low molecular weight, the danger is regarded as questionable. There is much

what has an odor strong in on the other hand photoresist vinyl ether being volatile, and there is much what the contraction at the time of hardening is accepted in as compared with photoresist epoxy. this invention persons were excellent in printabilities and hardenability, such as the fluidity and pigment dispersibility which solve these technical problems, and a misting, and in order that the hardening film might find out further the constituent for activity energy-line hardening mold ink which is excellent in surface hardness or solvent resistance, they inquired wholeheartedly.

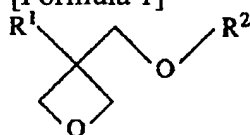
[0004]

[Means for Solving the Problem] this invention persons completed header this invention for the ability of the constituent which consists of cyclic ether which has specific structure by various examination to solve the above-mentioned technical problem as a constituent for activity energy-line hardening mold ink. Namely, the compound with which the 1st invention of this invention has 1-4 oxetane rings, The constituent for activity energy-line hardening mold ink which consists of an optical cationic initiator and a pigment, The constituent for activity energy-line hardening mold ink of the 1st invention which contains further the compound with which the 2nd invention has an epoxy group, The constituent for activity energy-line hardening mold ink of the 1st invention which contains further the compound with which the 3rd invention has a vinyl ether radical, The 4th invention is the constituent for activity energy-line hardening mold ink of the 1st invention which contains further the compound and the optical radical polymerization initiator which have an acryloyl (meta) radical. Hereafter, this invention is explained to a detail.

[0005] O The compound which has the oxetane ring used by compound this invention which has 1-4 oxetane rings has 1-4 oxetane rings. If the compound which has five or more oxetane rings is used, the fluidity of a constituent is lost and it may not be suitable for printing. Various things can be used for it if the compound which has the oxetane ring used by this invention is a compound which has 1-4 oxetane rings. As a compound which has one oxetane ring, the compound specifically shown by the following general formula (1) is mentioned.

[0006]

[Formula 1]



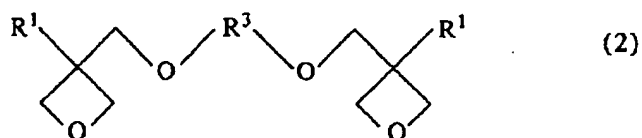
(1)

[0007] It sets at a ceremony (1) and is R1. They are the alkyl group of 1-6 carbon numbers, such as a hydrogen atom, a methyl group, an ethyl group, a propyl group, or butyl, the fluoro alkyl group of 1-6 carbon numbers, an allyl group, an aryl group, a furil radical, or a thienyl group. R2 The alkyl group of 1-6 carbon numbers, such as a methyl group, an ethyl group, a propyl group, or butyl, 1-propenyl radical, 2-propenyl radical, a 2-methyl-1-propenyl radical, The alkenyl radical of 2-6 carbon numbers, such as a 2-methyl-2-propenyl radical, 1-butenyl group, 2-butenyl group, or 3-butenyl group, The radical which has rings, such as a phenyl group, benzyl, fluoro benzyl, a methoxybenzyl radical, or a phenoxy ethyl group, The alkyl carbonyl group of 2-6 carbon numbers, such as an ethyl carbonyl group, a propylcarbonyl radical, or a butyl carbonyl group, The alkoxy carbonyl group of 2-6 carbon numbers, such as an ethoxycarbonyl radical, a propoxy carbonyl group, or a butoxycarbonyl radical, Or it is N-alkyl carbamoyl group of 2-6 carbon numbers, such as an ethyl carbamoyl group, a propyl carbamoyl group, a butylcarbamoyl radical, or a pentyl carbamoyl group, etc.

[0008] Next, as a compound which has two oxetane rings, the compound shown by the following general formula (2) is listed.

[0009]

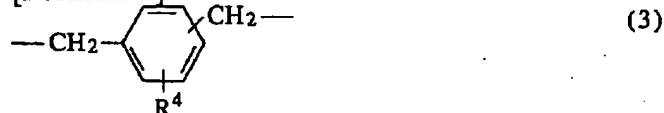
[Formula 2]



[0010] It sets at a ceremony (2) and is R1. It is the same radical as the thing in said general formula (1). R3 For example, they are the alkylene group containing lines, such as lines, such as lines, such as ethylene, a propylene radical, or a butylene radical, or a branching-like alkylene group, a poly (ethyleneoxy) group, or the Pori (propyleneoxy) radical, or a branching-like Pori (alkyleneoxy) radical, a pro PENIREN radical, a methyl pro PENIREN radical, or a butenylene radical, or a branching-like unsaturated hydrocarbon radical, a carbonyl group, and a carbonyl group, an alkylene group containing a carboxyl group, or an alkylene group containing a carbamoyl group. Moreover, R3 It is also the polyad chosen from the radical shown by the following type (3), (4), and (5).

[0011]

[Formula 3]



[0012] It sets at a ceremony (3) and is R4. The alkyl group of 1-4 carbon numbers, such as a hydrogen atom, a methyl group, an ethyl group, a propyl group, or butyl, They are halogen atoms, such as an alkoxy group of 1-4 carbon numbers, such as a methoxy group, an ethoxy radical, a propoxy group, or a butoxy radical, a chlorine atom, or a bromine atom, a nitro group, a cyano group, a sulfhydryl group, a low-grade alkyl carboxyl group, a carboxyl group, or a carbamoyl group.

[0013]

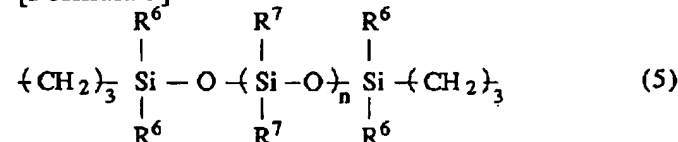
[Formula 4]



[0014] a formula (4) -- setting -- R5 An oxygen atom, a sulfur atom, a methylene group, NH, SO and SO2, and C (CF3)2 Or C(CH3) 2 it is .

[0015]

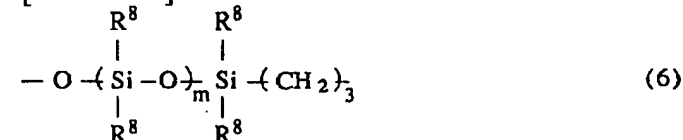
[Formula 5]



[0016] It sets at a ceremony (5) and is R6. They are the alkyl group of 1-4 carbon numbers, such as a methyl group, an ethyl group, a propyl group, or butyl, or an aryl group. n is the integer of 0-2000. R7 They are the alkyl group of 1-4 carbon numbers, such as a methyl group, an ethyl group, a propyl group, or butyl, or an aryl group. R7 It is also the polyad chosen from the radical shown by the following formula (6).

[0017]

[Formula 6]

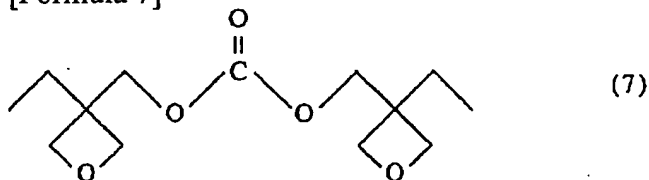


[0018] It sets at a ceremony (6) and is R8. They are the alkyl group of 1-4 carbon numbers, such as a

methyl group, an ethyl group, a propyl group, and butyl, or an aryl group. m is the integer of 0-100. As an example of a compound of having two oxetane rings, the compound shown by the following formula (7) and (8) is mentioned.

[0019]

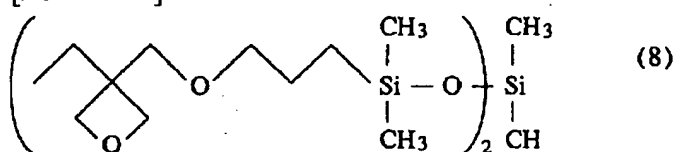
[Formula 7]



[0020] It sets at a ceremony (2) and the compound shown by the formula (7) is R1. An ethyl group and R3 It is the compound which is a carboxyl group.

[0021]

[Formula 8]

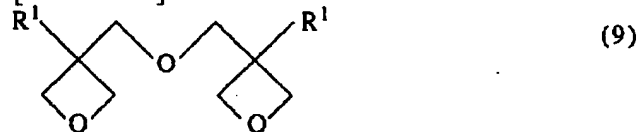


[0022] It sets to a general formula (2) and the compound shown by the formula (8) is R1. An ethyl group and R3 are R6 at a formula (5). And R7 They are a methyl group and the compound whose n is 1.

[0023] In the compound which has two oxetane rings, there is a compound shown by the following general formula (9) as desirable examples other than the above-mentioned compound.

[0024]

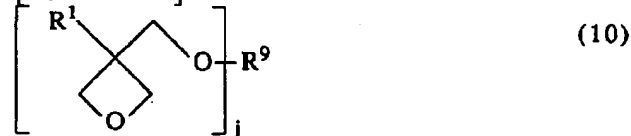
[Formula 9]



[0025] As a compound which has 3-4 oxetane rings, the compound shown by the following general formula (10) is mentioned.

[0026]

[Formula 10]



[0027] It sets at a ceremony (10) and is R1. It is the same radical as the thing in said general formula (1). R9 For example, the following type (11) Branching-like polysiloxy radicals, such as a radical shown by a branching-like Pori (alkyleneoxy) radical or the following formulas (15), such as a branching-like alkylene group of the carbon numbers 1-12, such as a radical shown by - (13), and a radical shown by the following formula (14), etc. mention, and it is ****. j is 3 or 4.

[0028]

[Formula 11]



[0029] In [type (11), R10 is low-grade alkyl groups, such as a methyl group, an ethyl group, or a propyl group.]

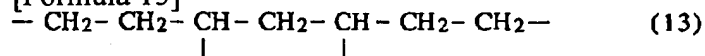
[0030]

[Formula 12]



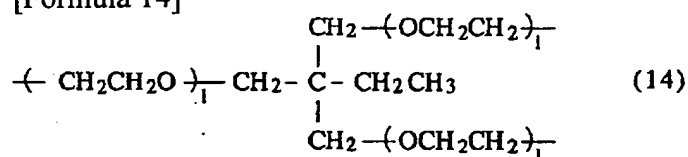
[0031]

[Formula 13]



[0032]

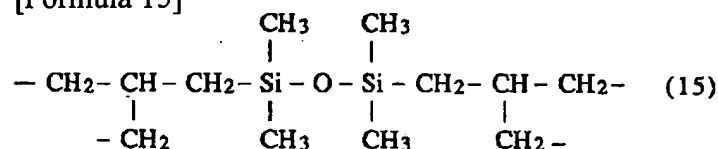
[Formula 14]



[0033] In [type (14), l is the integer of 1-10.]

[0034]

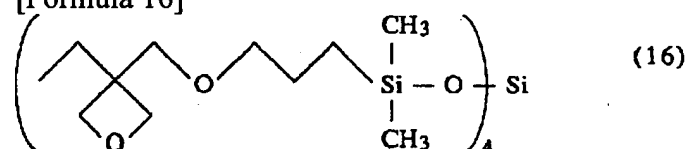
[Formula 15]



[0035] As an example of a compound of having 3-4 oxetane rings, the compound shown by the following formula (16) is mentioned.

[0036]

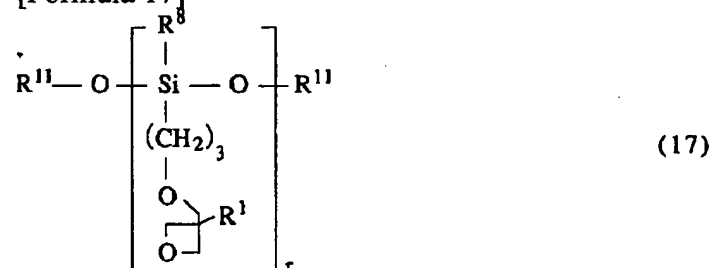
[Formula 16]



[0037] Furthermore, as an example of the compound which has 1-4 oxetane rings except having described above, there is a compound shown by the following formula (17).

[0038]

[Formula 17]



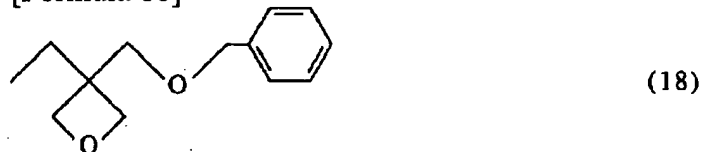
[0039] It sets at a ceremony (17) and is R8. It is the same radical as the thing in a formula (6). R11 is the

alkyl group or trialkylsilyl groups of carbon numbers 1-4, such as a methyl group, an ethyl group, a propyl group, or butyl, and r is 1-4.

[0040] There is a compound shown below as a more desirable example of the oxetane compound used by this invention.

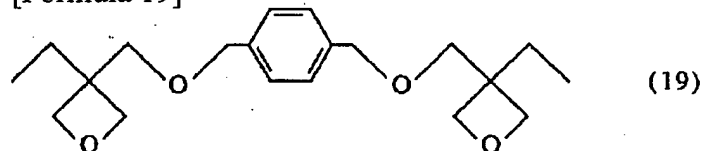
[0041]

[Formula 18]



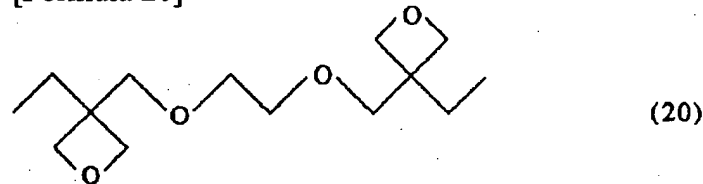
[0042]

[Formula 19]



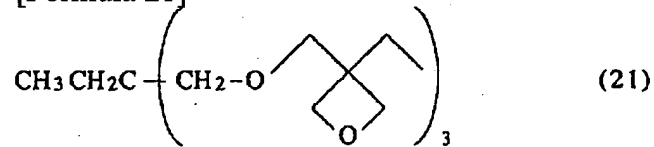
[0043]

[Formula 20]



[0044]

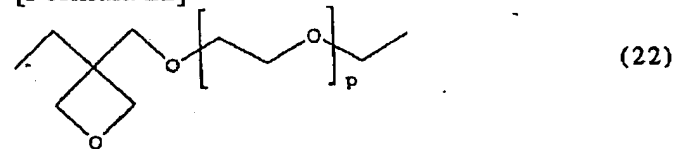
[Formula 21]



[0045] Moreover, the compound which has 1-4 oxetane rings which have the with a molecular weight of about 1000 to 5000 amount of macromolecules besides these is also mentioned. The following compounds are mentioned as these examples.

[0046]

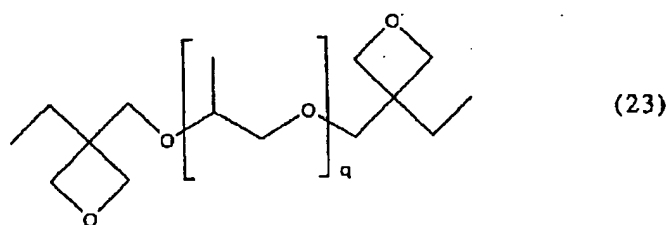
[Formula 22]



Here, p is 20-200.

[0047]

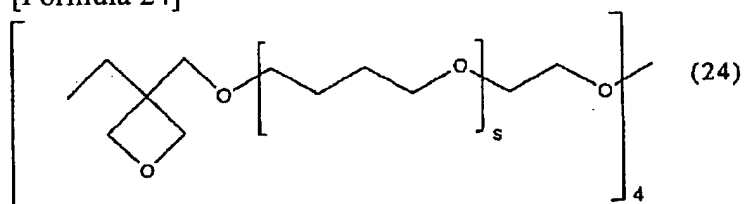
[Formula 23]



Here, q is 15-100.

[0048]

[Formula 24]

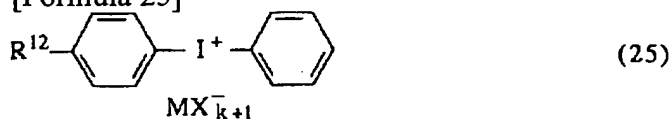


Here, s is 20-200.

[0049] O Various things can be used as an optical cationic initiator used with the constituent of optical cationic initiator this invention. A diaryl iodonium salt and a triarylsulfonium salt are mentioned as a thing desirable as these initiators. A typical optical cationic initiator is shown below.

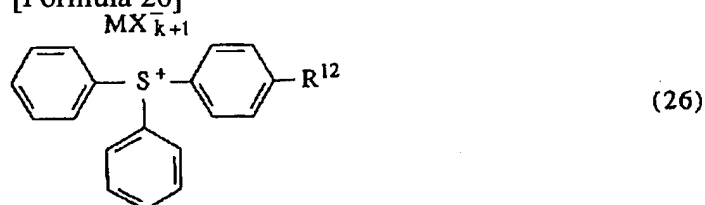
[0050]

[Formula 25]



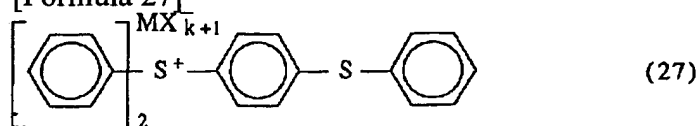
[0051]

[Formula 26]



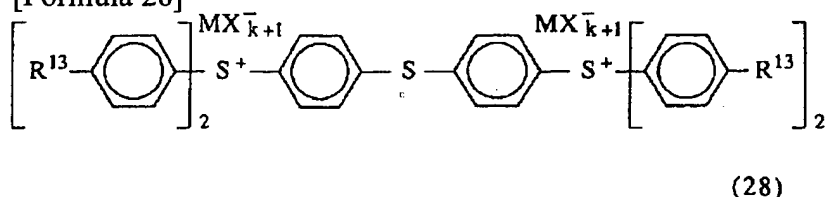
[0052]

[Formula 27]



[0053]

[Formula 28]



[0054] R12 is a hydrogen atom, the alkyl group of carbon numbers 1-18, or the alkoxy group of carbon

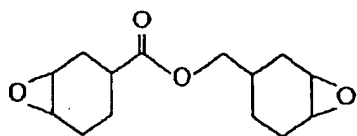
numbers 1-18 among a formula, and R13 is a hydrogen atom, a hydroxyalkyl radical, and a hydroxy alkoxy group, and is a hydroxy ethoxy radical preferably. M -- a metal -- desirable -- antimony -- it is -- X -- a halogen -- it is a fluorine preferably, and k is a metaled valence, for example, in the case of antimony, it is 5. As for an optical cationic initiator, it is desirable to contain at 0.1 - 20% of the weight of a rate to the compound which has an oxetane ring, and it is 0.1 - 10 % of the weight more preferably. When making the constituent of the 1st invention which carries out a postscript contain the compound which has the compound and/or vinyl ether radical which have an epoxy group further, it is desirable to contain at 0.1 - 20% of the weight of a rate to the total quantity of the compound which has the compound which has an oxetane ring, the compound which has an epoxy group, and/or a vinyl ether radical, and it is 0.1 - 10 % of the weight more preferably. When not filling to 0.1% of the weight, hardenability becomes less enough, when exceeding another side and 20 % of the weight, light transmission nature becomes poor, uniform hardening may not be able to be performed or the smooth nature on the front face of a paint film may be lost.

[0055] O As a pigment of the indispensable component of pigment this invention, various things, such as an organic pigment and/or an inorganic pigment, can be used. Specifically White pigments, such as titanium oxide, a zinc white, the white lead, RITOBON, and antimony oxide, Black pigments, such as aniline black, iron black, and carbon black, the chrome yellow, Synthetic Ochre, Hansa yellow (100, 50, 30 grades), titan yellow, Yellow pigments, such as benzine yellow and permanent yellow, chromium bar MIROON, Orange pigments, such as permanent Orange, Balkan Peninsula first Orange, and indanthrene brilliant Orange, Brown pigments, such as ferrous oxide, permanent Brown, and Para Brown, red ocher, Cadmium red, antimony vermilion, Permanent Red, a rhodamine lake, Red pigments, such as an alizarin lake, thioindigo red, PV carmine, mono-light first red, and the Quinacridone system red pigments, Cobalt purple, manganese purple, first violet, Violet Lake, Purple pigments, such as indanthrene brilliant violet and dioxazine violet, Ultramarine blue, Berlin blue, cobalt blue, an alkali blue lake, a non-metal copper phthalocyanine blue, Blue pigments, such as a copper copper phthalocyanine blue, indanthrene blue, and indigo, Chrome green, chrome oxide, emerald green, naphthol Green, Various fluorescence pigments besides green pigments, such as green gold, an acid Green lake, the Malachite Green lake, Phthalocyanine Green, and the poly KURORU bromine copper phthalocyanine, a metallic flake pigment, an extender, etc. are mentioned. The content of a pigment has the desirable 1 - 100 weight section to the compound 100 weight section which has an oxetane ring, and is 10 - 50 weight section more preferably. the compound which has an oxetane ring -- in addition, when blending the compound which has the compound which has the epoxy group described below, the compound which has a vinyl ether radical, and/or (meta) an acryloyl radical, the 1 - 100 weight section has the desirable loadings of a pigment to the total quantity 100 weight section of these hardenability components, and it is 10 - 50 weight section more preferably. When the content of the pigment to the hardenability component 100 weight section does not fulfill 1 weight section, it is hard to color a constituent, and the hardenability of a constituent may become scarce when exceeding the another side 100 weight section.

[0056] O Other components can be blended with the constituent of other compound this inventions if needed besides the above-mentioned indispensable component. The 2nd invention of this invention is a constituent for activity energy-line hardening mold ink containing the compound which has an epoxy group further in the constituent of the 1st invention. In this case, the cure rate of a constituent is further improvable by making an epoxy compound contain in a constituent. Various things can be used as a compound which has an epoxy group. For example, as an epoxy compound which has one epoxy group, there are phenyl glycidyl ether, butyl glycidyl ether, etc., and hexanediol diglycidyl ether, tetraethylene glycol diglycidyl ether, trimethylolpropane triglycidyl ether, bisphenol A diglycidyl ether, a novolak mold epoxy compound, etc. are mentioned as an epoxy compound which has two or more epoxy groups. It is desirable especially to use an alicyclic epoxy compound by this invention, for example, the compound shown below is mentioned.

[0057]

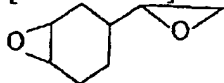
[Formula 29]



(29)

[0058]

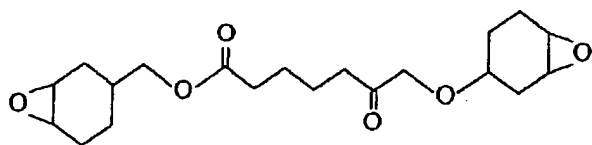
[Formula 30]



(30)

[0059]

[Formula 31]



(31)

[0060] In this case, as the blending ratio of coal of a compound which has an epoxy group, 5 - 95 weight section is desirable to the total quantity 100 weight section of the compound which has the 1-4 above-mentioned oxetane rings, and the compound which has an epoxy group.

[0061] The 3rd invention of this invention is a constituent for activity energy-line hardening mold ink containing the compound which has a vinyl ether radical further in the constituent of the 1st invention. In this case, the cure rate of a constituent is further improvable by making the compound which has a vinyl ether radical contain in a constituent. Various things can be used as a compound which has a vinyl ether radical. For example, as a compound which has one vinyl ether radical, hydroxyethyl vinyl ether, hydroxy butyl vinyl ether, dodecyl vinyl ether, propenyl ether propylene carbonate, cyclohexyl vinyl ether, etc. are mentioned. As a compound which has two or more vinyl ether radicals, the cyclohexane dimethanol divinyl ether, the triethylene glycol divinyl ether, the novolak mold divinyl ether, etc. are mentioned. In this case, as the blending ratio of coal of a compound which has a vinyl ether radical, 5 - 95 weight section is desirable to the total quantity 100 weight section of the compound which has the 1-4 above-mentioned oxetane rings, and the compound which has a vinyl ether radical.

[0062] The 4th invention of this invention is a constituent for activity energy-line hardening mold ink containing the compound and the optical radical polymerization initiator which have an acryloyl radical further (meta) in the constituent of the 1st invention. In this case, reforming of adjustment of constituent viscosity and the paint film degree of hardness of a constituent can be performed by making the compound which has an acryloyl (meta) radical contain in a constituent. (Meta) Various things can be used as a compound which has an acryloyl radical. For example, as a compound which has one acryloyl (meta) radical, the acrylate (meta) of the alkylene oxide addition product of these alcohol etc. is mentioned to the acrylate (meta) of a phenol, nonyl phenol, and 2-ethylhexanol, and a list. (Meta) As a compound which has two acryloyl radicals, the di(meth)acrylate of the alkylene oxide addition product of these alcohol etc. is mentioned to the di(meth)acrylate of bisphenol A, isocyanuric acid, ethylene glycol, and propylene glycol, and a list. (Meta) As a compound which has three acryloyl radicals, the Tori (meta) acrylate of the alkylene oxide addition product of these alcohol etc. is in pentaerythritol, trimethylol propane and the Tori (meta) acrylate of isocyanuric acid, and a list, and the Pori (meta) acrylate of pentaerythritol and dipentaerythritol etc. is mentioned as a compound which has four or more acryloyl (meta) radicals. Moreover, acrylic monomer oligomer with conventionally well-known the urethane acrylate which uses a urethane bond as a principal chain, the polyester acrylate which uses an ester bond as a principal chain, the epoxy (meta) acrylate which added the acrylic acid to the epoxy compound etc. is mentioned. In this case, as the blending ratio of coal of a compound which has an acryloyl (meta) radical, 5 - 95 weight section is desirable to the total quantity 100 weight section of the

compound which has the 1-4 above-mentioned oxetane rings, and the compound which has an acryloyl (meta) radical. An optical radical polymerization initiator is blended with a constituent in the 4th invention of this invention. Various things can be used as an optical radical polymerization initiator. As a desirable thing A benzophenone and its derivative, benzoin alkyl ether, 2-methyl [4-(methylthio) phenyl]-2-morpholino-1-propanone, Benzyl dimethyl ketal, 1-hydroxy cyclohexyl phenyl ketone, 2-hydroxy - 2-methyl-1-phenyl propane-1-ON, alkyl phenylglyoxylate, a diethoxy acetophenone and 2-benzyl-2-dimethylamino-1-(4-morpholino phenyl)-1-butane -- non, acyl phosphine oxide etc. is mentioned to a list. As for the content of these optical radical polymerization initiators, it is desirable that it is 0.01 - 20 % of the weight to the compound which has an acryloyl (meta) radical.

[0063] Moreover, in this invention, two or more sorts chosen as the compound which has the epoxy group described above to the constituent of the 1st invention, and the compound list which has a vinyl ether radical from [(meta) the compound and the optical radical polymerization initiator] which have an acryloyl radical can also be blended. In this case, it is desirable that the total quantity of the compound which has the compound which has an epoxy group, the compound which has a vinyl ether radical, and (meta) an acryloyl radical to the total quantity 100 weight section of a compound which has the compound which has the 1-4 above-mentioned oxetane rings, the compound which has an epoxy group, the compound which has a vinyl ether radical, and (meta) an acryloyl radical as these blending ratio of coal is 5 - 95 weight section.

[0064] Inerts like an inorganic bulking agent, a color, a viscosity modifier, a processing agent, an organic solvent, and an ultraviolet-rays cutoff agent can be blended with the constituent of this invention in the amount to the 100 weight sections per hardenability component of the 100 weight sections besides the above-mentioned component. As an example of an inorganic filler, for example A zinc oxide, an aluminum oxide, antimony oxide, A calcium oxide, chromic oxide, the tin oxide, titanium oxide, an iron oxide, copper oxide, A metal / nonmetal oxides, such as a lead oxide, bisumuth oxide, a magnesium oxide, and manganese oxide, Hydroxides, such as an aluminum hydroxide, ferrous hydroxide, and a calcium hydroxide, Silicon compounds, such as salts, such as a calcium carbonate and a calcium sulfate, and a silicon dioxide, Various metals, such as aluminum, iron, and zinc, etc. are mentioned to synthetic inorganic substances, such as minerals, such as natural pigments, such as a kaolin, a bentonite, clay, and talc, natural zeolite, an Oyaishi stone, a natural mica, and Iona Ito, synthetic mica, and permutite, and a list. Although there are some these which overlap said pigment, in addition to the pigment of said indispensable component, these can also be combined with a constituent as a filler if needed.

[0065] The photosensitizer other than an optical cationic initiator or/and an optical radical polymerization initiator can be added to the constituent of this invention, and the wavelength of UV field can also be adjusted to it. as the typical sensitizer which can be used in this invention -- Crivello -- what [J.V.Crivello, Adv.in Polymer Sci., 62, and 1 (1984)] are indicating is mentioned, and, specifically, there are a pyrene, perylene, an acridine orange, a thioxan ton, 2-chloro thioxan ton, a benzo flavin, etc.

[0066] O The constituent of operation this invention can be used by using paper, a film, or a sheet as a base material by lithography, such as various print processes, for example, offset printing etc., Toppan Printing, silk screen printing, or gravure. After this printing, a constituent irradiates an activity energy line and stiffens it. As an activity energy line, ultraviolet rays, an X-ray, an electron ray, etc. are mentioned. Various things can be used as the light source which can be used when making it harden by ultraviolet rays, for example, pressurization or a high-pressure mercury-vapor lamp, a metal halide lamp, a xenon lamp, an electrodeless discharge lamp, or a carbon arc lamp is mentioned. When making it harden with an electron ray, what various irradiation equipment can be used, for example, a cock loft WARUTOSHIN mold, a BANDE graph mold, or a resonance transformer mold is mentioned, and has 50-1000eV energy as an electron ray is desirable, and is 100-300eV more preferably. Since cheap equipment can be used in this invention, it is desirable to use ultraviolet rays for hardening of a constituent.

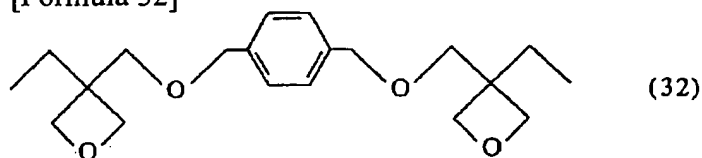
[0067]

[Example] An example and the example of a comparison are given to below, and this invention is explained more concretely. In addition, the section in each following example is weight criteria.

[0068] As the following compound (32) (henceforth Component A) 100 section which has the manufacture oxetane ring of an example 1- constituent and which has the two following oxetane rings as a compound, and an optical cation initiator Mixed the 20 sections, the talc 1.5 section, and the wax 2 section, the following compound (33) (following component G) 4 section and a pigment (SHIMURA first yellow GTF235D) were made to mill by 3 roll mills, and the constituent for activity energy-line hardening mold ink was manufactured.

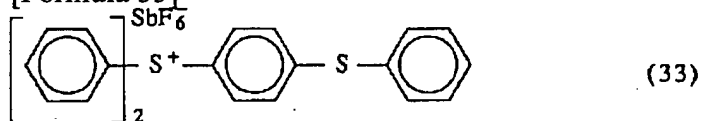
[0069]

[Formula 32]



[0070]

[Formula 33]



[0071] - the following evaluations were performed about an evaluation profit **** constituent and the hardening film. Those results are shown in the following table 2.

[0072] O When operating a misting trial inkometer on condition that 1200rpm, ink carried out the evaluation judging of the condition of dispersing in the shape of a fog on the outskirts, by viewing.

O : don't scatter.

**: Scatter a little.

x: Scatter.

[0073] O coating of the hardenability profit **** constituent was carried out by the thickness of 10 micrometers on the BONDE light steel plate of the thickness of 0.8mm, width of face of 50mm, and die-length 150mm magnitude, this is repeated on condition that conveyor speed 10 m/min in under the high-pressure mercury lamp of 80 W/cm and a condensing mold to 10cm location, the bottom of a mercury lamp was passed, and it was made to harden The count of pass (count of passage) until adhesiveness disappears from a front face on the above-mentioned hardening conditions estimated.

[0074] O About the hardening film obtained by the pencil degree-of-hardness above, it is JISK. It evaluated according to 5400.

[0075] O The hardening film obtained by the solvent-resistance above was ground with the cotton swab into which the methyl ethyl ketone was infiltrated, and it expressed as the count until a substrate comes to be in sight.

[0076] The constituent for activity energy-line hardening mold ink was manufactured like the example 1 except having used the component of the presentation shown in two to example 7 table 1. About the constituent and hardening film which were obtained, it evaluated like the example 1. Those results are shown in Table 2.

[0077] The constituent for activity energy-line hardening mold ink was manufactured like the example 1 except having used the component of the presentation shown in one to example of comparison 3 table 1. About the constituent and hardening film which were obtained, it evaluated like the example 1. Those results are shown in Table 2.

[0078]

[Table 1]

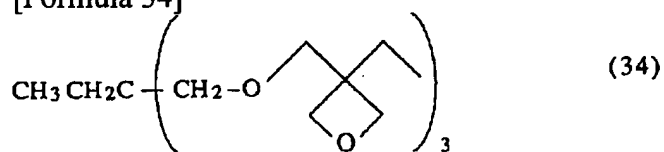
	A	B	C	D	E	F	G	H
实施例 1	100						4	
实施例 2	50	50					4	
实施例 3			25		75		4	
实施例 4	75					25	3	1
实施例 5	25			50		25	3	1
实施例 6	50				25	25	3	1
实施例 7	75			25			4	
比较例 1					100		4	
比较例 2				75	25		4	
比较例 3				25		75	1	3
比较例 4					75	25	3	1

[0079] In Table 1, several show the section each. Moreover, in Table 1, component B-H shows the following compounds.

[0080] - Component B (compound which has three oxetane rings)

[0081]

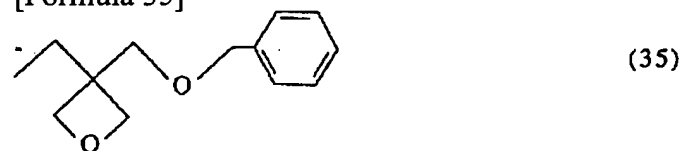
[Formula 34]



[0082] - Component C (compound which has one oxetane ring)

[0083]

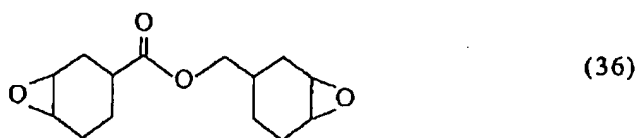
[Formula 35]



[0084] - Component D (compound which has two epoxy groups)

[0085]

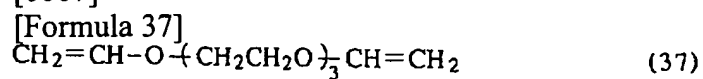
[Formula 36]



[0086] - Component E (compound which has two vinyl ether radicals)

[0087]

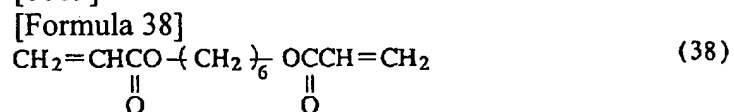
[Formula 37]



[0088] - Component F (compound which has two acryloyl radicals)

[0089]

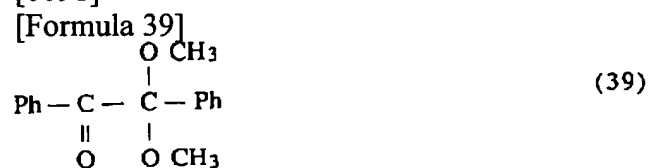
[Formula 38]



[0090] - Component H (optical radical polymerization initiator)

[0091]

[Formula 39]



[0092]

[Table 2]

	ミステイク	硬化性 (ハス)	鉛筆硬度	耐溶剤 性
実施例 1	○	7	3 H	7 8
実施例 2	○	6	4 H	7 2
実施例 3	○	3	H	8 9
実施例 4	○	6	3 H	7 4
実施例 5	○	2	2 H	8 1
実施例 6	○	3	H	9 2
実施例 7	○	2	3 H	7 5
比較例 1	△	3	F	5 2
比較例 2	△	硬化せず	—	—
比較例 3	△	1 1	2 H	6 8
比較例 4	△	8	H	6 2

[0093]

[Effect of the Invention] The constituent for activity energy-line hardening mold ink of this invention is a thing which has very high practicality and which whose cure rate is quick, is excellent also in printabilities, such as a misting, and is excellent also in the surface hardness and solvent resistance as printed matter after hardening.

[Translation done.]